

REMARKS

Applicant respectfully request reconsideration of the present application in view of the foregoing amendment and the reasons that follow.

Claim 22 has been cancelled. No other claims have been amended or added. Following entry of this amendment, claims 13-21 and 23-24 remain in the application.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Rejections under 35 U.S.C. § 103

In the Office Action, the previously applied grounds of rejection were withdrawn in favor of new bases for rejection, in light of the new claims submitted in the previous response. Claims 13, 15, 23 and 24 presently in the application stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the basic combination of three prior art citations, namely, the newly cited Huff patent (U.S. 5,246,065), Hashimoto (EP 1026198), and Applicant's admitted prior art. The remaining claims stand rejected under § 103 based on this combination of prior art citations taken in combination with another piece of prior art. These new rejections are respectfully traversed. Reconsideration and withdrawal are respectfully requested.

Claim 13 recites a method for producing a heat exchanger header tank from plastic by means of injection molding that includes the steps of: injection molding in an injection molding apparatus, at a first temperature to form a heat exchanger header tank, a plastic composition consisting essentially of a polyamide that contains a crystallization accelerating agent; during the injection molding step, adding to the plastic composition under pressure a physical blowing agent comprising a gaseous composition; removing the molded heat exchanger header tank from the injection molding apparatus while the surface of the plastic material is at a second temperature that is below the first temperature and greater than a temperature at which injection molded polyamide heat exchanger header tanks are normally

removed from injection molding apparatus; and immediately inserting into the removed heat exchanger header tank a tensioning member for preventing significant changes in shape of the header tank.

A consideration of the patentability of a claimed invention under § 103 requires the PTO to take into account the invention “*as a whole*,” which includes not only the problem(s) to be solved by the claimed invention but also all of the advantages that flow from the claimed subject matter, when taken as a whole. The rejections set forth in the outstanding Office Action fail to properly do so.

The claims are directed to a particular process used to produce plastic header tanks for automotive heat exchange devices, such as radiators or condensers, which operate at relatively high pressures. In order to make such processes economical and as efficient as possible, the header tanks are withdrawn from the injection molding apparatus as quickly as possible during cooling, which requires that the tanks be supported by a tensioning member, in order to maintain their shape, due to high sealing tolerances for the end product. Such specialized products and the relatively unique set of process steps used to make them provide a special environment that gives rise to a special set of problems to be overcome. This unique set of problems and the advantages achieved in solving those problems must be taken into consideration as part of the “invention as a whole” under § 103.

One special issue or problem that arises in the course of the claimed method is the shrinkage of the polymer material during the cooling stage. Because of the high strength requirements due to high pressures present in automotive heat exchanger tanks, weaknesses in the tank walls that can occur during cooling shrinkage must be avoided, and this problem is exacerbated by the practice of removing the not-fully-cooled tanks from the mold and supporting them with tensioning means. For example, material thinning or even shrink holes can form during cooling, especially in tanks having thinner wall thicknesses. This problem is overcome according to the invention by the addition of a physical blowing agent during the molding step.

As noted in paragraph 0007 of Applicant's disclosure, according to one aspect, Applicant's invention advantageously compensates for volumetric shrinkage that results during cooling of a plastic during the unique further processing steps following injection molding. Claim 13 is directed to a preferred embodiment in which the tanks are formed of a plastic material consisting essentially of a polyamide. The claim calls for the step of "during the injection molding step, adding to the plastic composition under pressure a physical blowing agent comprising a gaseous composition."

It should be recognized that automotive header tanks are not conventionally made from foamed plastic materials, due to the inherently weaker physical strength of thin walled foamed materials. Thus, the presently claimed addition of a physical blowing agent has to be considered as counterintuitive in this art. Further, the present record contains no evidence of employing foamed materials to make automotive header tanks. In fact, Applicant believes that physical blowing agents are not common employed in the case of polyamide materials, in any context and certainly not in the context of the present invention.

Addition of the physical blowing agent during molding has the very advantageous effect of compensating for wall thinning and/or shrink holes that may be formed during the cooling stage. Furthermore, this benefit also contributes toward the efficiency of the molding process, inasmuch as it further enables the molded tanks to be removed from the mold cavity at an earlier point in time.

The teachings of the prior art are clearly deficient to render the claimed invention, as a whole, obvious. Although the primary reference to Huff is directed to the manufacture of automotive heat exchanger tanks from polyamide, the process disclosed is quite different from the claimed process in several very significant respects. As acknowledged by the PTO, Huff does not disclose or suggest introducing a physical blowing agent during the molding stage. The PTO also recognizes that Huff does not remove his molded tanks from the mold at a point in the cooling cycle that requires the use of tensioning means to maintain the shape of the tanks. In fact, according to the preferred embodiment of Huff, the tank is left in the mold until it cools sufficiently to carry out an overmolding step to add an elastic gasket to the tank lip.

The PTO mainly cites EP 1026198 to Hashimoto in an attempt to rectify these fundamental deficiencies of the primary reference; however, Hashimoto completely fails to do so. Hashimoto is directed to a polypropylene composition, and in particular a very specialized polypropylene composition. Hashimoto does not even mention any polyamide materials! Furthermore, EP 1026198 does not disclose the step of “injection molding in an injection molding apparatus, at a first temperature to form a heat exchanger header tank, a plastic composition consisting essentially of a polyamide that contains a crystallization accelerating agent” (emphasis added), nor the step of adding to the plastic composition under pressure a physical blowing agent comprising a gaseous composition during the injection molding. EP 1026198 also fails to disclose the step of “removing the molded heat exchanger header tank from the injection molding apparatus while the surface of the plastic material is at a second temperature that is below the first temperature and greater than a temperature at which injection molded polyamide heat exchanger header tanks are normally removed from injection molding apparatus.” For that matter, neither is the final step of claim 13 disclosed in the reference. It is difficult to understand why Hashimoto has been cited at all in connection with the presently claimed invention, except possibly from hindsight. There is clearly no basis for combining Hashimoto with Huff.

Further, the PTO incorrectly alleges that Hashimoto discloses “adding to the plastic composition under pressure a physical blowing agent comprising a gaseous composition,” with citation of paragraph 121 of the reference. No such disclosure or suggestion is contained in Hashimoto, not even with respect to the polypropylene compositions disclosed therein. Paragraph 121 of Hashimoto sets forth a laundry list of possible additives that may be added to the polypropylene compositions of the reference, containing some 25 different conventional additive materials, including *inter alia* a “foaming agent.” First, this is hardly a teaching of adding any foaming agent, to even a polypropylene composition, for manufacturing an automotive heat exchanger tank (which products, by the way, are nowhere specifically mentioned in Hashimoto). Second, the disclosure does not specify adding such an additive during the molding process, i.e., foaming additives are often contained in the polymer material as formulated. Most significantly, the cited disclosure of Hashimoto refers to “additives” for polypropylene compositions, and like each and every one of the other

additives included in the laundry list, the foaming agents would be understood not as physical blowing agents (i.e., gases) but as chemical (solid or liquid) foaming agents. Finally, even this general teaching must be taken as implying that one would add a “foaming agent” when one intends to make a foamed material, and as discussed above, this is not done in the art of making automotive heat exchanger tanks.

The question must therefore be asked: What is there in either Huff or Hashimoto, or any possible combination thereof, that suggests, to a person of ordinary skill in the art of making automotive heat exchanger tanks, that problems of shrink holes or weaknesses can be avoided in the context of the claimed manufacturing method by injecting a physical blowing agent into the claimed polyamide material during the injection molding process? Applicant suggests that there is absolutely no teaching or suggestion of the claimed invention in these references, individually or in combination. In fact, Applicant submits that there is no known reason for including a physical blowing agent in a polyamide material during the process of injection molding automotive heat exchanger tanks. Finally, not only does the prior art fail to suggest adding a blowing agent within the claimed method, but the prior art entirely fails to recognize or appreciate the above-described advantages that flow from the claimed invention.

For these reasons, it is respectfully submitted that the stated rejection of claims 13, 15, 23 and 24 is fatally defective under § 103 and should be withdrawn. All remaining claims depend directly or ultimately from claim 13 and are likewise believed to be patentable over the prior art for at least the same reasons as claim 13, since all further rejections are based upon the basic combination of Huff and Hashimoto.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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